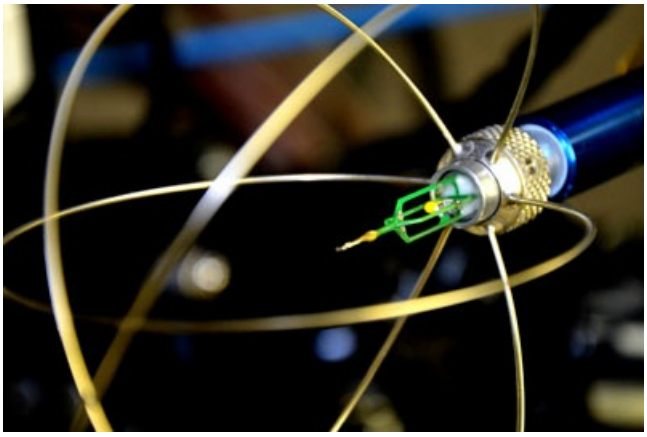

Two INL facilities are contributing to a Canadian National Research Council study on the quality of office environments. Here, an air speed sensor captures data at INL's Willow Creek Building.

INL participates in Canadian National Research Council office environment study

By John Howze *INL Communications & Governmental Affairs*

Idaho National Laboratory will provide one-third of the U.S. sites for a Canadian National Research Council (CNRC) study of the quality of indoor office environments. The four-year study is using a mobile, high-tech computerized sensor system to gather data on factors that affect the comfort and satisfaction of office workers.

"Our four-year Post Occupancy Evaluation project includes a field study of 20 buildings across the United States and Canada," said Benjamin Birt, Ph.D., one of the researchers on the project. "We are researching both 'green' buildings and more traditional buildings to study energy use and how it relates to occupant satisfaction and work performance."

Canadian researcher Benjamin Birt, center, with collaborators Gunnar Gladics, left, of University of Idaho, and INL Sustainability manager Chris Ischay.

Birt recently visited INL to collect data from two of its buildings. He was accompanied through INL's Willow Creek Building by University of Idaho research scientist Gunnar Gladics, and INL Sustainability Program Manager Chris Ischay.

"This is important to us because our new buildings not only need to be greener environmentally, but they need to be comfortable places to work," Ischay said. "Besides saving energy, they really should be the kind of environments where workers are very satisfied to be."

Birt said current trends, particularly in green buildings, are moving toward individual lighting level control and air temperature control in each office or cubicle. Surprisingly, this can lead to lower overall energy use.

"Studies have shown that when you let individuals determine their own lighting levels, for instance, there's a wide variety in choices, but on average they choose around 450 lux (41.9 foot-candles) — whereas the recommended lighting level may be 500 lux (46.5 foot-candles)," he said. "The same studies have shown that not only does it save energy, but there are improvements in employee well-being and organizational commitment, all things that are good for the employer, too."

The Center for Advanced Energy Studies building at INL is a Leadership in Energy and Environmental Design (LEED) Gold certified building.

Birt also noted a significant trend toward wireless offices — spaces where people move in and out and use portable devices like laptops — a trend which makes for more flexibility in use of a given space.

At INL, the researchers took measurements at a variety of office locations in the Center for Advanced Energy Studies (CAES) and Willow Creek Building, which represent different building design types. CAES is a Leadership in Energy and Environmental Design (LEED) "Gold" certified building — the second highest rating in the LEED classification system. CAES was built to strict standards of energy efficiency and sustainability.

"Sustainability is at the heart of our approach to managing the infrastructure of INL," said Scott D. McBride, INL's director of Facility Management. "Our vision as an institution is to achieve our missions while preserving the resources future generations will need."

The INL buildings are two among up to six U.S. sites in the study, which is primarily of Canadian buildings. But it will yield data that could aid building industry experts everywhere, Birt said. "Our primary focuses are lighting, acoustics and indoor air quality, as they relate to energy consumption and the comfort of occupants."

For each office that is measured, lighting levels are determined at head level, at desk surface level, and also by light reflected from walls and other surfaces (luminance). Temperature is measured at the occupant's location. Researchers also measure air speed, levels of particulates, formaldehyde, carbon monoxide, carbon dioxide and total volatile organic compounds. The team is about halfway through the study now, Birt said.

Birt helped design this pyramid-shaped unit containing sound sensors.

For each office where data is gathered, a survey link is sent to the office occupant(s) that helps assess their comfort and satisfaction with the temperature, lighting, acoustics and other factors.

Along with building experts, psychologists and other researchers will study all the data to better understand how office buildings can be built to achieve the highest occupant satisfaction while saving energy and having other environmental benefits.

The University of Idaho Integrated Design Lab is assisting the CNRC with the study — and provided the key link to INL as a study participant. The design lab, within UI's College of Art and Architecture, is part of a grant-funded group of five research laboratories in the Northwest. All participants are funded through the Northwest Energy Efficiency Alliance, and each lab is associated with a university.

A total of four buildings in Idaho (including INL's), perhaps two more in the United States, and up to 14 in Canada will be evaluated. Each participating organization will receive a report on its buildings. There will be an overall general report and a host of scientific papers, Birt said.

In the end, the output will be used in ways that improve building codes, regulations and requirements, and help improve the design and evaluation of buildings in the future.

"As we move into the status of a world-class research institution, it is important that our architecture be sustainable, our indoor environments be pleasing as well as functional, and our people be very satisfied with the space in which they work," said Debby Tate, INL's representative on the Battelle Sustainability Community of Practice — a national Battelle best practices group. "The results of this study will help INL and others do a better job of creating exactly those types of work spaces in the years to come."

Feature Archive